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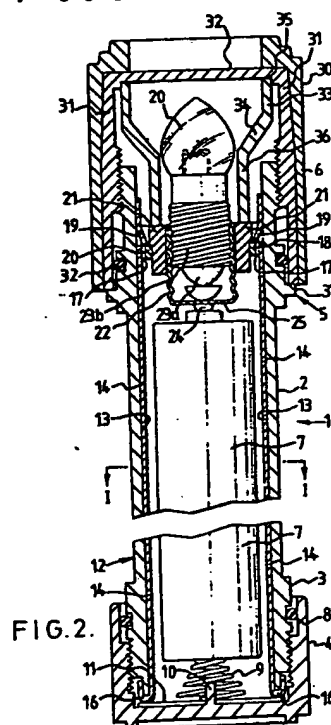
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(54) **Torch**

(57) A torch comprises a tubular housing 2 for batteries 7. The housing is closed at a lower end by an end cap 4 and at an upper end by a reflector assembly 6. The assembly 6 bears against a frame 21 which carries a bulb 20 and contacts 28 (not shown) which form part of a switch. The contacts 28 connect a terminal of the bulb 20 to arms 29 (not shown) of conductors 14 thus forming a switch, the conductors extending along the housing 2 to contact a negative terminal of the batteries 7. The switch is opened and closed by moving the frame 21 within the housing 2 to slide the contacts 28 into and off the arms 29. The frame is urged upwardly by a spring 10 urging the batteries upwardly against the frame, and downwardly by the reflector assembly 6 which is screwed onto the housing 2. A flange 21 and ribs 26 (not shown) on the frame limit movement of the frame by engaging a rib 18 on the housing inner wall.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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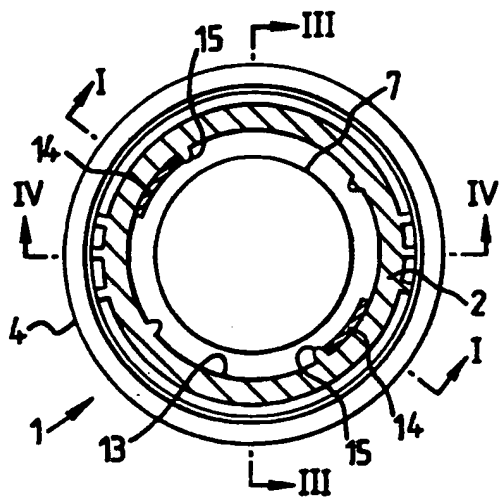


FIG. 1.

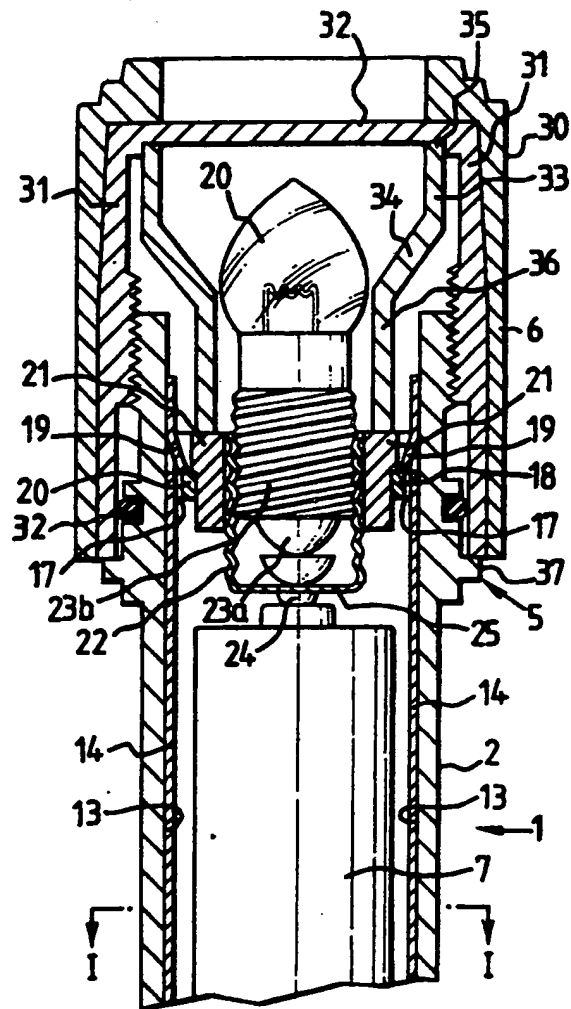
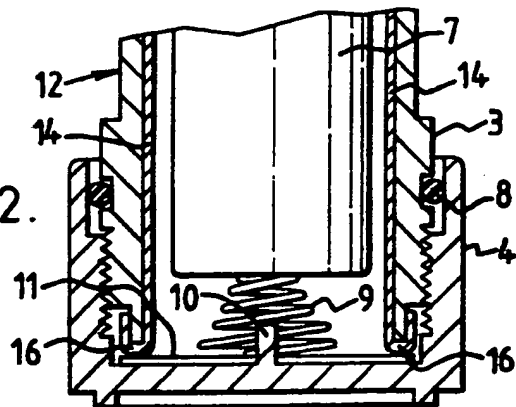


FIG. 2.



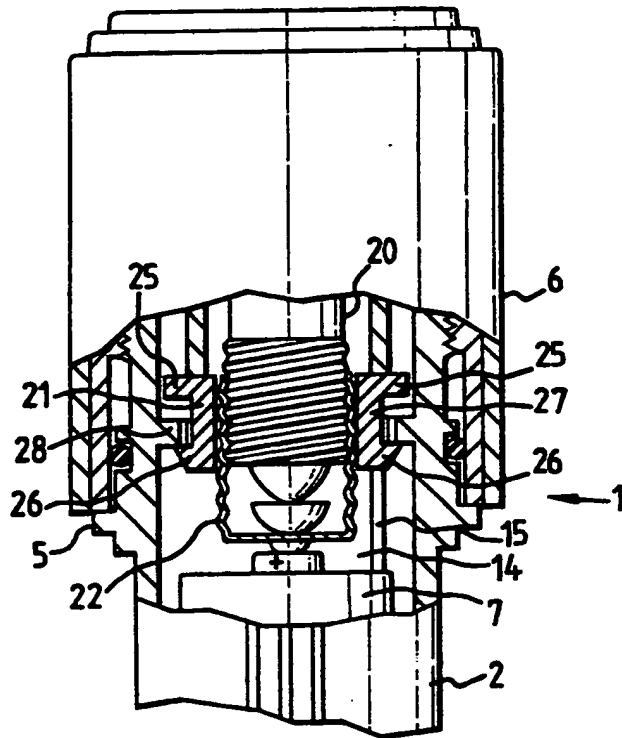


FIG. 3.

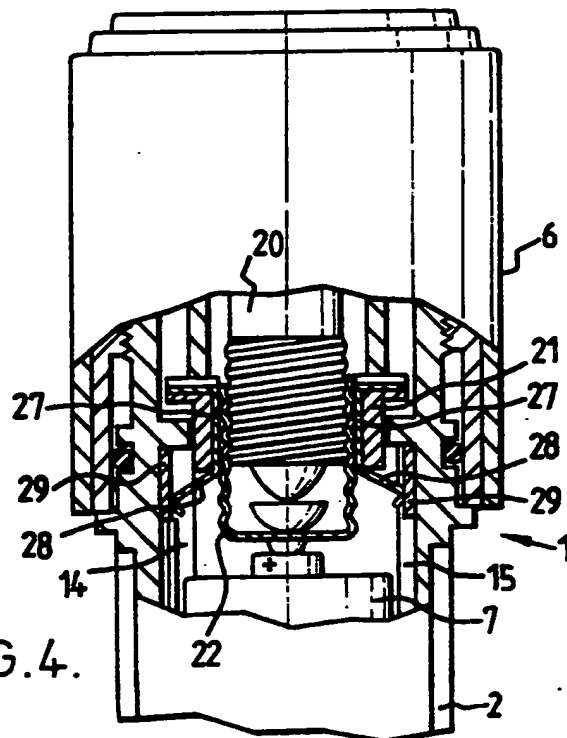


FIG. 4.

TORCH

The present invention relates to a torch.

The invention provides a torch comprising an elongate tubular housing for housing a battery, a bulb mounted
5 in the housing at one end thereof on a frame which is movable longitudinally of the housing, the bulb having a first terminal electrically connected via a switch to a terminal of a battery when one is mounted in the housing, the switch comprising a pair of
10 contacts movable into and out of contact with one another by movement of the frame in the housing, and means for moving the frame in the housing to open and close the switch.

Other preferred features and advantages of the
15 invention will be apparent from the following description and the accompanying claims.

The invention will be further described by way of example with reference to the accompanying drawings, in which:-

20 Figure 1 is a transverse cross sectional view through

a torch according to the invention, taken along the line I-I of Figure 2;

Figure 2 is a cross-section along the line II-II of Figure 1, showing the torch switched off;

5 Figure 3 is a cross-sectional part view along the line III-III of Figure 1, similar to Figure 2, but showing the torch switched on; and

Figure 4 is a cross-sectional part view along the line IV-IV of Figure 1, with the torch switched on;

10 Referring to the drawings, a torch 1 according to the invention comprises an elongate tubular battery housing 2 of generally circular cross-section closed at a lower end 3 by a battery cover 4 and at an upper end 5 by a reflector assembly 6. The housing 2
15 houses two A-A size batteries 7, aligned axially, but the torch may be sized to take other battery combinations.

The cover 4 is attached to the housing 2 by a screw thread, and an 'O' ring 8 is provided in a groove in the outer surface 12 of the housing 2, the 'O' ring 8 forming a generally water tight seal between the cover 4 and housing 2. The cover carries a conically wound, electrically conducting spring 9 mounted on a post 10 and in electrical contact at its upper end with a negative terminal of one of the batteries 7, and at its bottom end with an electrically conducting metal plate 11 mounted in the end cap. The plate 11 contacts two strip conductors 14 which run along the inside surface 13 of the housing 2.

The conductors 14 each lie alongside a rib 15 on the inside surface 13 of the housing and have a U-shaped formation 16 at their bottom ends which grips the edge of the lower end of the housing 2. The opposite ends of the conductors 14 pass through a gap 17 between a rib 18 integrally formed on the inside surface of the housing 2 and are held against downward movement through the gap 17 by resilient tongues 19 stamped from the conductors.

A bulb 20 is carried in a frame 21 at the upper end of the housing. The frame 21 is annular and carries

at its centre an electrically conducting metal sleeve 22 into which the bulb 20 is screwed. A terminal 23a of the bulb 20 contacts a positive terminal of the adjacent battery via a contact 24 rivetted to a
5 non-conducting plate 25 carried in the lower end of the sleeve 22. The sleeve 22 itself makes electrical contact with the second terminal 23b of the bulb 20.

The frame 21 is slidable in the axial direction of the housing 2, in the region of the rib 18. The
10 axial movement of the frame is limited by a flange 25 on the upper end of the frame and an nibs 26, formed on lower ends of two diametrically opposed resilient tongues 27 which depend down from the frame. The flange 25 and nibs 26 are spaced apart to allow a
15 limited degree of axial movement, the flange 25 and nibs 26 engaging the rib 18 as the frame moves downwardly or upwardly respectively. Cutouts are formed in the rib 18 to allow the nibs 26 to be snapped past the rib as the frame is inserted in the
20 housing through the upper end, the cutouts serving also to align the frame circumferentially during insertion. The flange 25 has two cut-outs which each straddle a conductor 14, to prevent circumferential movement of the frame after the nibs 26 have been
25 pressed down past the rib 18. The spring 10 urges

the batteries 7 against the contact 24 and hence urges the frame upwards, towards the position seen in Figure 3.

Referring to figure 4, which shows the frame in the same position as figure 3, two electrically conducting resilient contacts 27 are mounted in the frame 21. The contacts are sandwiched between the sleeve 22 and the frame 21 and each has a downwardly depending leg 28 which bears against the inner surface 13 of the housing 2. Each conductor strip 14 has a laterally extending arms 29 just below the rib 18, the arm 29 extending circumferentially a short distance around the inner surface 13. In the position seen in figure 4, the legs 28 each bear against a respective arm 29. As the frame is urged downwardly (vide hereinafter), the legs 28 ride off the arms 29 to break the electrical contact, the legs 28 and arms 29 forming a switch. Dual contacts are provided to optimise the performance of the switch.

Referring to figure 1, the frame 21 is urged downwards, against the force of the spring 9, by the reflector assembly 6. The assembly 6 comprises an outer, opaque cylinder 30 carrying a transparent cylinder 31 closed at one end 32 to form a plane

lens. The cylinder 31 is threaded at its lower end and screws on to the upper end 5 of the housing 2. An 'O' ring 32 is provided between the cylinder 31 and the housing 2 to form a substantially watertight seal. A reflector 33 having a generally parabolic portion 34 is mounted at an upper end 35 in the cylinder 31. A lower end 36 is of narrower diameter than the upper end 35 and bears against the frame 21. The axial length of the reflector 33 is arranged such that, subject to manufacturing tolerances generally found in the art of plastics torches, when the reflector assembly 6 is screwed down firmly onto the housing 2, the cylinder 31 abutting a peripheral flange 37 on the housing, the reflector 33 urges the frame 21 against the rib 18. In this position, the torch is switched off, i.e. legs 28 do not bear against the arms 29 (cf Figure 4). As the reflector assembly 6 is unscrewed slightly, perhaps 1/2 to 1 turn depending on the coarseness of the thread, the frame is allowed to be moved upwardly by the spring 10, against the lower end of the reflector 33, bringing the legs 28 into contact with the arms 29, which thus completes the electrical circuit between the batteries and the bulb 20 (through spring 9, plate 11, conductors 14, and sleeve 22).

By arranging the switch so that the assembly 6 is unscrewed to turn the torch on, there is less inclination to unscrew the assembly too far as is the case with an arrangement in which the assembly 6 is
5 unscrewed to turn the torch off (the user wishing to ensure that the torch is definitely off).

When it is necessary to change the bulb, the reflector assembly 6 can be unscrewed completely, the nibs 26 holding the frame 21 inside the housing
10 against the pressure of the spring 10. Similarly, when charging the batteries 7, the flange 22 prevents the frame falling down through the housing.

Accordingly there is provided a torch in which commonly used parts, the spring 9 urging the
15 batteries in to contact with the bulb, and the reflector assembly 6, have been used to operate a switching mechanism.

The torch parts may be made of plastics material as appropriate. The outer cylindrical surfaces of the
20 end cap 4 and the cylinder 30 may be knurled to enhance grip and longitudinal ribs 38 are provided on the housing 2.

Whilst reference has been made to upper and lower ends of the torch for ease of description it will be appreciated that the torch may be used in any orientation.

- 5 Various modifications may be made and it is desired to include all such modifications as fall within the scope of the accompanying claims.

CLAIMS

1. A torch comprising an elongate tubular housing for housing a battery, a bulb mounted in the housing at one end thereof on a frame which is movable
5 longitudinally of the housing, the bulb having a first terminal electrically connected via a switch to a terminal of a battery when one is mounted in the housing, the switch comprising a pair of contacts movable into and out of contact with one another by
10 movement of the frame in the housing, and means for moving the frame in the housing to open and close the switch.

2. A torch as claimed in claim 1, wherein the end of the housing is closed by an end cap which is
15 movable relative to the housing to move the frame longitudinally of the housing.

3. A torch as claimed in claim 2, wherein the frame is biased in a first direction longitudinally of the housing and is moved opposite to said first
20 direction by movement of the end cap.

4. A torch as claimed in claim 3, wherein the frame is biased against the end cap.

5. A torch as claimed in claim 2, 3 or 4, wherein the end cap is mounted on the housing by a screw thread connection.

5 6. A torch as claimed in claim 4, wherein the frame is moved in the first direction to close the switch, and in the opposite direction to open the switch.

10 7. A torch as claimed in claim 6, wherein the end cap is mounted on the housing by a screw thread connection and the end cap is screwed onto the housing to open the switch and is partly unscrewed to close the switch.

15 8. A torch as claimed in any one of claims 3 to 7, wherein the frame is biased by a spring positioned at the other end of the housing, the biasing force of the spring being transferred to the frame via the battery.

20 9. A torch as claimed in any one of claims 1 to 8, wherein the switch comprises a first of said pair contacts mounted on an inner wall of the casing and electrically connected to a terminal of a battery mounted in the housing, and the second of the

contacts is mounted on the frame and electrically connected to the bulb, the second contact being shaped to bear against the inner wall of the casing and sliding onto the first contact to close the
5 switch.

10. A torch as claimed in claim 9, wherein the switch comprises two pairs of contacts operating in parallel.

11. A torch as claimed in any one of claims 1 to
10 10, wherein limiting means is provided for limiting the extent of movement of the frame in the housing.

12. A torch as claimed in claim 11, wherein said limiting means comprises a rib on the inner wall of the casing and formations provided on said frame to
15 either side of the rib to limit the movement of the frame past the rib.

13. A torch as claimed in claim 12, wherein one of said formations comprises a rib on an end of a resilient tongue formed on the frame, the tongue
20 being snapped past the rib to instal the frame in the housing.

14. A torch substantially as hereinbefore described
with reference to the accompanying drawings.